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Conference Abstract

Producing High-Quality 3-D Models for Specimen Research with the Creaform 3-D Scanner at the Sternberg Museum of Natural History

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Abstract

Digitization of natural history collections for specimen accessibility, research, and posterity has been a major push in museums over the past decade. One increasingly common form of specimen digitization is three-dimensional (3-D) surface scanning. There are numerous 3-D scanners on the market, including visible light and laser surface scanners. However, mobility of the scanning device, mesh resolution, and texture fidelity are among the most prominent issues facing regular implementation of 3-D scanning procedures for research purposes. Morphometrics research involving the digitization of *Xiphactinus* at the Sternberg Museum of Natural History (FHSM) using a Creaform Go!SCAN 50 visible light 3-D surface scanner has necessitated the development of a workflow using this 3-D scanner and the associated VXelements software. This workflow maximizes model quality with minimal loss of speed or efficiency when scanning numerous specimens. Major components of this workflow include proper use of positioning targets, appropriate merging of multiple specimen scans, and how to perform post-processing on models without sacrificing model resolution or texture.

The primary benefit of the Creaform 3-D scanner is hardware mobility, allowing for use on large exhibited specimens or digitizing specimens during research trips. Shortcomings include relatively low mesh resolution, (bottoming out at 0.5 mm), difficulty scanning highly

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complex structures, and low texture fidelity of scanned models. However, texture fidelity can be improved through use of the free software, Meshlab, by overlaying high-quality stacked photographs onto the 3-D mesh. Incorporating Meshlab texture overlays into the workflow allows for the production of digital models with improved color and textural data – ideal for accurate visualization of specimens in 3-D viewers for educational outreach and online databases. While not perfect for all applications, the Creaform 3-D scanner allows for rapid digitization of specimens in an increasingly digital collections environment, and is sufficient for some research applications. The workflow established at the FHSM can serve as a framework for other institutions to use the Creaform 3-D scanner to best suit their digitization needs.

Keywords

digitization, museum, paleontology, morphometrics, 3D scanning, Creaform, VXelements, Meshlab, *Xiphactinus*, Sternberg Museum of Natural History, FHSM

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